Beyond the Latest Frontier: Licensed, Unlicensed, and Experimental Operations above 95 GHz

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Fulfilling a promise made by Chairman Pai in the fall that the Federal Communications Commission would give a close look to opening up licensed operations in the bands above 95 GHz, the FCC announced tentatively on February 1 that it will consider commencing a rulemaking to do just that at its next Open Meeting on February 22. The Commission released a draft Notice of Proposed Rulemaking ("*Draft NPRM*") with the announcement that details how the Commission may go about fostering investment and innovation in the 95-275 GHz range and beyond. If approved, the so-called *Spectrum Horizons* NPRM would seek comment on potential rules for fixed point-to-point use of tens of gigahertz of new spectrum, more than 15.2 gigahertz of unlicensed spectrum, and more flexible experimental licenses in the 95-3000 GHz range.

Background:

Use of spectrum above 95 GHz is largely uncharted territory. Apart from several minor authorizations for amateur radio and industrial, scientific, and medical ("ISM") operations under Part 18, all non-Federal operations in these frequency ranges have only been permitted by the FCC via experimental licenses. Various parts of this extremely broad range of bands are used by radio astronomy and other passive services.

The Commission has used its *Spectrum Frontiers* proceeding to gauge interest in spectrum above 95 GHz. While several parties filed comments in that proceeding touting a range of both communications and non-communications applications services (including spectroscopy, imaging, and sensing), the Commission took no meaningful steps toward making the band more available. The *Draft NPRM* would seek comment on **(I)** possible licensed operations in various frequency ranges; **(II)** making particular frequency bands available for unlicensed use; and **(III)** creating a new framework for experimental licenses for spectrum above 95 GHz.

I. Licensed Allocations

The *Draft NPRM* would seek comment on possible rules for fixed point-to-point operations in approximately 36 gigahertz of spectrum, namely all of those between 95 and 275 GHz where there are already fixed allocations but there are *not* Fixed Satellite or Mobile Satellite Services ("FSS" and "MSS"," respectively): 95-100, 102-109.5, 111.8-114.25, 122.25-123, 130-134, 141-148.5, 151.5-158.5, 174.5-174.8, 231.5-232, and 240-241 GHz. However, the FCC also seeks comment on potentially adopting service and license rules where there are shared allocations with FSS or MSS in a substantial number of other bands totaling more than 65 gigahertz between 158.5 and 275 GHz.

The *Draft NPRM* would propose that rules in these bands may be based on the light-licensing fixed point-to-point rules that currently apply to the 70/80/90 GHz bands which provide for:

- Non-exclusive nationwide licenses in any portion of the bands in question with 10-year terms
- Registration of links through a system maintained by a database manager
- A twelve-month construction requirement (after registration)
- Interference protection based on registration priority

The *Draft NPRM* would seek comment on utilizing a different transmitted power limit than in the 70/80/90 GHz bands for fixed operations above 95 GHz, and would invite comment on any other deviations from the 70/80/90 GHz regime that interested parties believe would be necessary or appropriate.

As written, the *Draft NPRM* requests feedback on whether to permit fixed point-to-multipoint systems in addition to fixed point-to-point links in these bands, and on whether there is any interest in deploying mobile services in spectrum above 95 GHz.

Noting that almost all of the bands in the 95-275 GHz range that would be under consideration are shared bands, the *Draft NPRM* devotes considerable space to raising issues regarding shared operation of licensed fixed links with other allocated uses, as applicable, including not only FSS and MSS, but radio astronomy, Earth Exploration Satellite Service ("EESS"), the Space Research Service ("SRS"), the Inter-Satellite Service ("ISS"), radiolocation, and radionavigation, as well as sharing between Federal and non-Federal users.

II. Unlicensed Operations

The *Draft NPRM* is written to propose creating four unlicensed-specific bands under a framework generally based on the regime governing unlicensed operations in the 57-71 GHz band: 122-123 GHz, 244-246 GHz, 174.8-182 GHz, and 185-190 GHz. The rulemaking would also inquire whether other bands in the ranges above 95 GHz should be made available for unlicensed operations, such as 116-122 GHz.

This anticipated proposal comes in the wake of the Commission declining in the November 2017 *Spectrum Frontiers* orders that, in general, turned a deaf ear to please by Microsoft and others to increase unlicensed opportunities in the range between 24 and 86 GHz. In contrast with that action, the *Draft NPRM* states that "[p]otential future [unlicensed] applications in these bands [might]include ultra-high definition video, and high-speed data transmission, such as temporary fiber optic line replacement, chip-to-chip communication within computer equipment, and replacement of computer data cables in data centers with wireless links."

Further, given that these frequencies enable certain non-communications applications of potential interest to industry and research, such as emerging terahertz spectroscopy applications, the *Draft NPRM* includes queries whether unlicensed operations more properly fall within the Part 18 ISM rules, and what changes in that rule part may be appropriate to accommodate these uses.

III. Experimental Licenses

Finally, the *Draft NPRM* is written to consider creating a new subpart to the FCC's Experimental Radio Service ("ERS") rules to better encourage experiments in the spectrum range between 95 GHz and 3 THz (3000 GHz). The *Draft NPRM* posits that current experimental licensing rules do not provide

adequate incentives for investment, development, and commercialization in that frequency range. Accordingly, the Commission would consider a variety of options for liberalizing experimental rules above 95 GHz, including:

- *Greater Marketing Flexibility* by allowing direct sales of experimental equipment used in market trials to trial participants (whereas existing ERS rules only allow limited equipment sales to other ERS licensees during market trials).
- *Broader Geographic Scope* by giving experimental licensees "substantial flexibility to conduct ... experiments over a wide geographic area ... and adapt their program of experimentation as needed."
- *Longer License Terms* namely ten-year term instead of the two- and five-year terms currently available for other ERS licenses.

What's Next?

The FCC is tentatively scheduled to vote on the draft item during the Open Commission Meeting scheduled for February 22. Assuming the item is approved, the *Draft NPRM* suggests that comments will be due 30 days (and reply comments 45 days) after the date of publication in the *Federal Register*. The mere issuance of the *Draft NPRM* is welcome news for a number of equipment and service developers who have been pushing for greater access to these frequency ranges and, if the Commission's expectations reflected in the draft item are fulfilled, may give others reason to pursue plans that have not been fully ignited because of the lack of formal encouragement to develop a regulatory framework, and greater certainty, in these bands.